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# United States Patent [19]

Hashizume et al.

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[54] INK JET RECORDING HEAD HAVING  
REDUCED STRESS CONCENTRATION  
NEAR THE BOUNDARIES OF PRESSURE  
GENERATING CHAMBERS

3-65350 3/1991 Japan ..... 347/68  
5-504740 7/1993 Japan ..... B41J 2/16  
5-286131 11/1993 Japan ..... B41J 2/045

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[75] Inventors: Tsutomu Hashizume; Tetsushi  
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Nagano, Japan

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[73] Assignee: Seiko Epson Corporation, Tokyo,  
Japan

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## [30] Foreign Application Priority Data

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Primary Examiner—John Barlow

Assistant Examiner—C. Dickens

Attorney, Agent, or Firm—Sughrue, Mion, Zinn, Macpeak  
& Seas, PLLC

[51] Int. Cl.<sup>7</sup> ..... B41J 2/045

## [57] ABSTRACT

[52] U.S. Cl. .... 347/70

[58] Field of Search ..... 347/68, 70, 71,  
347/72

An ink-jet recording head comprising: an elastic sheet providing pressure generating chambers; nozzle orifices, each communicating with the pressure generating chamber; piezoelectric vibrators formed on the elastic sheet, each of the piezoelectric vibrators having, a lower electrode formed on the elastic sheet, a piezoelectric layer formed on the lower electrode, and an upper electrode formed on the piezoelectric layer such that the upper electrode faces the respective pressure generating chamber, wherein the upper electrodes of the piezoelectric vibrators are positioned independently of each other; an electrical insulator layer having windows, wherein the electrical insulator layer covers the upper electrodes; and a conductor pattern connecting with the upper electrodes via the windows of the electrical insulator layer.

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12 Claims, 7 Drawing Sheets

